

Appl. No. 10/848,869
Amdt dated November 23, 2007

REMARKS/ARGUMENTS

Specification Amendment

The specification is amended as shown above on page 13, based on originally-filed Claim 9 on page 30.

Claim Rejections – 35 U.S.C. §101

Claims 13 and 14 were rejected under 35 U.S.C. §101 as being directed to non-statutory subject matter. The Examiner appeared to indicate at the bottom of page 2 of the current Office Action that the term 'medium' is broadly interpreted to include waves. This statement is traversed because the Examiner has interpreted the word 'medium' out of context. Originally-filed Claims 13 and 14 used the word "medium" with an adjective "storage" which cannot be ignored. The Examiner has not explained, in the current Office Action, as to why the word "storage" is given no patentable weight.

In paragraph [0042] Applicants have identified three types of media, namely non-volatile media, volatile media and transmission media, but note that Applicants have only stated that the transmission media can take the form of waves. Accordingly, the other two media, namely non-volatile media and volatile media are not to be interpreted by the Examiner to cover waves. Hence, Claims 13 and 14 are now amended to require "non-volatile media" which includes optical or magnetic disks as stated in line 5 of Applicants' paragraph [0042]. Non-volatile media also includes various devices such as PROM, EPROM, FLASH-EPROM, memory chip, cartridge, magnetic tape, punch cards, paper tape etc. as stated in lines 2-5 of paragraph [0043]. Non-volatile media does not cover pure waves or signals. In view of the above amendment, Applicants respectfully request the Examiner to withdraw the §101 rejection of Claims 13 and 14.

Claim 1 Rejection

Claim 1 remains rejected under 35 U.S.C. §102 as being anticipated by US Patent 4,785,400 granted to Kojima. This rejection is respectfully traversed as follows.

In explaining the anticipation rejection of Claim 1, the Examiner stated as follows at the bottom of page 3 of the current Office Action:

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In response to applicant's argument, Kojima teaches *in the case of a slot for the first row of the table 202 of FIG. 2B, data "A, 316" is stored in the slot (see e.g., col. 7 lines 11-13) and a storage location of a row within the subsidiary storage 112 (FIG. 1) can be designated by a data page number i and a slot number j. Therefore, the combination 301 of the data page number i and the slot number j is called a row number (see e.g., col. 7 lines 20-25) wherein the data page number referred as row-identifier, the slot number referred as value, and a row number referred as a pair.*

In the above-quoted remarks the Examiner admits that Kojima teaches a combination of data page number and slot number, together to form a row number to identify a row.

Hence a first issue with the Examiner's suggestion at the end of the above-quoted text, namely "wherein *the data page number* referred as row-identifier" as stated above, is that a combination is necessary for Kojima to identify a row, i.e. Kojima's data page number itself (as suggested by the Examiner) is insufficient to fully identify a row.

Secondly, the Examiner's suggestion "wherein *the data page number* referred as row-identifier" does not fully identify a row in Kojima's patent for another reason. Kojima teaches that his page contains multiple slots. See Kojima at column 7 lines 14-16 ("Each data page 302 includes slot pointers 303 each indicating a starting address of a respective one of the slots 304 within the same data page"). Because Kojima's data page number identifies multiple rows, it cannot be referred to as a row-identifier.

Moreover the Examiner's suggestion towards the end of the above-quoted text "... *the slot number* referred as value" is invalid for the following reason. Claim 1 is amended to clarify that each value comprises data in the row identified by the row-identifier. For support, see Applicants' specification, paragraph [0001], lines 1-5. Because Kojima's slot number does not appear to include any data, this is a third issue with the Examiner's explanation.

In explaining the rejection, the Examiner further stated as follows in the top half of page 4 of the current Office Action:

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Applicant argued Kojima does not teach the claimed limitation "a 'group' of row identifiers are used 'repeatedly' to find corresponding page numbers and store the page numbers that are thus found in a structure"

In response to applicant's argument, Kojima teaches *an analysis part 105 of the program 103 then analyzes the search command to determine the most suitable process sequence for that search command, generates codes which designate the determined process sequence, and stores the process sequence designating codes 107 into a control block 106 (see e.g., col.3 lines 4-9) wherein the process sequence for that search command referred as repeatedly finding and the table data to be processed, such as the commodity table 201 (FIG. 2A) is stored in units of a data page, for example, as shown by 302 in FIG. 5, and these data pages are stored in the subsidiary storage 112 with some data pages being duplicated in the data buffer areas 110 (see e.g. col. 3, lines 16-22) which referred as corresponding page numbers found and store the page numbers that are thus found in a structure as claimed.*

In the above-quoted remarks the Examiner appears to have misunderstood Applicants' position. Applicants "claimed limitation" does not require page numbers. In particular, please note that there are no "page numbers" in Applicants' Claim 1.

Also in the above-quoted remarks, the Examiner admits that Kojima's data pages are themselves are stored (in storage 112 or areas 110) by execution of Kojima's codes.

So, a fourth issue is that Kojima does not appear to teach (in the Examiner-cited text) that corresponding page numbers are stored in a structure prior to retrieval of the data pages themselves. Claim 1 is amended to clarify that repeatedly finding, and storing in a structure are done prior to retrieval of the block. For support, see Applicants' specification, paragraphs [0004] and [0005] on page 2.

A fifth issue is that the Examiner has not shown use of a "database index" by Kojima. Note that this limitation was present in originally-filed Claim 1. However, the Examiner appears to have no explicit explanation for this requirement of Claim 1. Note

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that the Examiner cited at the bottom of page 7 of the Office Action to Kojima's column 3, lines 4-9 and column 3 lines 10-22 but nothing in this cited text appears to disclose any "database index." Hence, this is another distinction of Claim 1 over Kojima.

A sixth issue is that the Examiner has not identified what specific item in Kojima's disclosure is referred to as the "structure" of Claim 1 and which item is the "cache." Is Kojima's "data buffer areas 110" referred to as the "structure" or the "cache" (please note that these are two different items in Claim 1)?

If the Examiner continues to use Kojima in a future Office Action, the Examiner is respectfully requested to explicitly identify what is referred to as the "structure" in Kojima's patent, what is referred to as the "database index" in Kojima's patent, and what is referred to as the "cache" in Kojima's patent.

In explaining the rejection of Claim 1, the Examiner further stated as follows towards the bottom of page 4 and top of page 5 of the current Office Action:

In response to applicant's argument, Kojima teaches the result 203 of the search is shown in FIG. 2D. For example, the first row (E) of the salesman column of the commodity table 201 coincides with the fourth row (E) of the employee column of the telephone number table 202. Therefore, the commodity X3 belonging to the commodity column in the first row of the commodity table 201, and the EXT telephone number 331 belonging to the telephone number column in the third row of the telephone number table 202 are listed in the first row of the result table 203 as shown in FIG. 2A, along with the coincident salesman's name E. The data relating to salesman B, G and C are similarly listed. (see e.g., col.4 lines 19-31) which is the disclosed limitation.

In the above-quoted remarks the Examiner has merely shown an example of query processing by Kojima. Nothing in the above-quoted text appears to be related to row numbers of Kojima. Hence, there appears to be no disclosure in the above-quoted text, of storing several block-identifiers in a structure, wherein the block identifiers are of blocks that contain rows identified by row-identifiers in the "group." Note that Claim 1

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now requires such storing to be performed prior to block retrieval. Hence, this is a seventh distinction of Claim 1 over Kojima.

In explaining the rejection of Claim 1, the Examiner also stated as follows towards the middle of page 5 of the current Office Action:

Applicant argued Kojima does not teach the claimed limitation "a single operation is performed to fetch multiple pages"

In response to applicant's argument, Kojima teaches the data pages being fetched by reading out from the subsidiary storage into an appropriate data buffer (see, e.g. FIG. 7 and FIG. 10).

In the above-quoted remarks the Examiner again appears to have misunderstood Applicants' position. Applicants "claimed limitation" does not require fetching multiple pages. In particular, please note that there are no "pages" in Applicants' Claim 1.

Furthermore, note that Kojima's FIG. 7 only shows processing of one data page. See Kojima's step 502 which checks if "THIS DATA PAGE IS READ OUT INTO THE DATA BUFFER 110?". If the answer is "NO" then step 503 is performed to "READOUT i-th DATA PAGE FROM THE SUBSIDIARY STORAGE INTO AN APPROPRIATE DATA BUFFER". Note that Kojima fetches only one data page in step 503. In step 504 Kojima obtains a data buffer number where the data page is stored. In step 505 Kojima obtains an address for the j-th slot. After step 505, the flow of Kojima's FIG. 7 simply ends. Hence, it appears that Kojima's fetching of a next page requires the method of FIG. 7 to be repeated to start from step 502 and again access subsidiary storage. Therefore, Kojima appears to require N accesses for N pages, i.e. one access per page.

In contrast, a single access operation to fetch multiple blocks as per Claim 1 is more efficient because it avoids context switching. Claim 1's single access retrieves a number of blocks that are identified by a corresponding number of block-identifiers. This is in contrast to Kojima's use of multiple accesses, because a context-switch can occur between any two pages being accessed in Kojima's method.

Also, a startup time for accessing subsidiary storage is spread across a number of blocks being read if a single access is performed as per Claim 1. This makes Claim

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1's single access faster than Kojima's multiple individual access operations (one for each page). See lines 1-6 at the top of page 8 of Applicants' specification, in paragraph [0022]. Therefore, this is an eighth distinction of Claim 1 over Kojima.

In explaining the rejection of Claim 1, the Examiner also stated as follows towards the bottom half of page 5 of the current Office Action:

Applicant argued Kojima does not teach the claimed limitation "a structure containing page identifiers to fetch into a buffer the pages that are identified in the structure."

In response to applicant's argument, Kojima teaches *during the processing, data required for the processing, but not yet loaded, is loaded into a data buffer area 110 in the main storage 101 from a data page area 141 in a subsidiary storage (see e.g., col. 3, lines 16-19) wherein the data required for the processing disclosed the limitation.*

In the above-quoted remarks the Examiner again appears to have misunderstood Applicants' position. Applicants "claimed limitation" does not require "page" identifiers and does not require fetching "pages." As noted above, that there are no "pages" in Applicants' Claim 1.

Also, note that Kojima's "data required for the processing, but not yet loaded" is available only after its retrieval, i.e. only after access to secondary storage. Claim 1 has been amended to require block identifiers to be stored in the structure prior to retrieval of the block. Hence, this is a ninth distinction of Claim 1 over Kojima.

Thus, Applicants respectfully submit that Claim 1 is not anticipated by Kojima. Reconsideration and withdrawal of this rejection is respectfully requested.

Claims 2-11, 13, 14 and 16-19

Claims 2-11 depend from Claim 1 and are, therefore, likewise patentable.

Claim 2 provides a further distinction over Kojima as follows. The Examiner cited to Kojima's column 1, lines 31-37 against Claim 2, which are reproduced below:

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In a pipelined processor, data elements are fetched in advance of execution of an operation on the data elements by successively generating the addresses of the data elements to be fetched within a data storage, in advance of the execution of the operation, so that data elements are successively supplied to an ALU with a small time pitch.

Nothing in the above-quoted text by Kojima appears to disclose sorting of block identifiers, prior to retrieval of the blocks by performing a single access operation. The word "sort" is nowhere in the above-quoted text.

New Claim 19 further distinguishes over Kojima by requiring Claim 2's sorting to be based on adjacency of blocks relative to one another which is not disclosed in the above-quoted text. For support of Claim 19, see paragraph [0030] on page 10 of Applicants' specification.

Claim 3 provides a further distinction over Kojima as follows. The Examiner cited to Kojima's column 1, lines 1-11 which are reproduced below:

BACKGROUND OF THE INVENTION

The present invention relates to a method for processing a data base, especially a relational data base.

In a relational data base, data is managed conceptually in the form of tables. If we arrange the physical storage into the style of a table, however, operations such as insertion or deletion of data become more difficult.

Nothing in the above-quoted text appears to support the Examiner's position that Kojima "explains the storage of the identifiers." The Examiner further cited to Kojima's column 5, lines 17-21 which are reproduced below:

In the preferred embodiment, a sort operation is done on the vectors 1503 and 1504 (FIG. 17) to generate the vector data 1801 and 1802 (FIG. 18) which are obtained after arrangement of the vector data 1503 and 1504 in alphabetical order according to employee designation.

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This text by Kojima appears to disclose sorting the data itself, which appears to be done after data becomes available, which in turn appears to happen after page retrieval. In contrast, Claim 3, which depends from Claim 2, requires sorting of block identifiers, before retrieval of blocks.

Claim 5 also provides a similar distinction over Kojima's column 8, lines 66-68 and column 9 lines 1-9 at least because Claim 5 depends from Claim 1 which requires repeatedly finding to be performed prior to block retrieval.

Claim 8 distinguishes over Kojima's column 7 lines 40-45 because the Examiner has at most shown that Kojima's buffer is the same size as the data page. The Examiner has not shown that the size of "data buffer area 110" has its number of buffer units identical to a number of page identifiers that can be held in Kojima's structure. If the Examiner continues to use Kojima in a future Office Action, the Examiner is respectfully requested to explicitly identify what is referred to as the "array" in Kojima's patent, what is referred to as the "number of entries" in that array, what is referred to as the "cache" in Kojima's patent, what is referred to as the "blocks" in that cache.

In explaining the rejection of Claim 9, the Examiner cited to Kojima's column 7, lines 62-68 and column 8 lines 1-2 for explaining writing into the buffer directory. See the top half of page 9 of the current Office Action. Note that Claim 9 depends from Claim 1 and hence Claim 9's writing is required in addition to storing of blocks into the cache as per Claim 1. In rejecting Claim 1, the Examiner had already used Kojima's writing into the buffer directory, by citing to Kojima's FIG. 7. Kojima's FIG. 7 is described in Kojima's column 7, lines 62-68 and column 8 lines 1-2. Hence a single "writing" step into Kojima's buffer directory is being used in the current Office Action to reject two different claim limitations in Claim 9 (including Claim 1), which is improper. Claim 9 is therefore patentable for this additional reason.

If the Examiner continues to use Kojima in a future Office Action, the Examiner is respectfully requested to explicitly identify what is referred to as the "structure" in Kojima's patent, what is referred to as the "cache" in Kojima's patent and what is

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referred to as the "log" in Kojima's patent, all of which are required by Claim 9 (via dependency from Claim 1).

Note that Claim 9 is further amended now to require a write operation in addition to writing of logs, and this amendment is supported throughout the original application, including, for example, the first sentence in paragraph [0024] on page 8.

Claim 4 was rejected over the teaching of Kojima as modified by Tolkin's US Patent 6,466,942, in paragraph 8 on page 10 of the current Office Action. This rejection is respectfully traversed as follows. Firstly, Tolkin's column 6, lines 24-28 cited by the Examiner are for an updated record, and state that an update is rejected. Accordingly, even if the Examiner's combination is correct, the combined teachings still fail to disclose that duplicate checking is done in Kojima's modified method subsequent to finding a row in a page, but prior to storing the row number into a structure, and prior to retrieval of the data page itself. Instead, Kojima's modified method appears to do duplicate checking during update as per Tolkin. Secondly, modification of Kojima's method as proposed by the Examiner appears to contradict Kojima's need for fetching of data with regular address increment. Specifically, when processing a vector instruction, if a vector data element is not present due to its duplicate being present elsewhere, then vector data elements cannot be fetched successively as needed for Kojima's pipelined processing. Claim 4 is therefore patentable for these additional reasons.

Claim 11 was rejected in the bottom half of page 12 of the current Office Action with the Examiner modifying Kojima's teachings using Vagnozzi's column 4, lines 24-32 to explain how an offset affects storing data during processing. Vagnozzi's column 4, lines 24-33 is reproduced below:

Referring to FIG. 1, there is shown a database 20 comprising a table of records 22. Each of the records has a fixed length and is assigned a unique record number, starting with zero. This allows the records to be stored sequentially in a single file with the location within the file of any particular record simply being determined by multiplying the record length (in bytes) by that record's assigned record number and using the resulting

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value as an offset from the beginning of the file. This arrangement provides very simple and fast allocation, de-allocation, and re-use of data record space within the file.

This text by Vagnozzi appears to disclose that an offset from the beginning of a file determines the location of a record within the file. However, nothing in the above-quoted text appears to indicate that multiple file offsets are provided to a single access operation. Claim 11 is therefore patentable for this additional reason.

Claim 10 was rejected in page 18 of the current Office Action with the Examiner modifying Kojima's teachings using Vagnozzi and Hashimoto (US Pub No. 200310110352 A1). Note that US Pub No. 200310110352 A1 cited by the Examiner has a "typo" and is hereinafter presumed to be US Pub No. 20030110352 A1.

In explaining the rejection of Claim 10, the Examiner stated that Kojima does not explicitly disclose unpinning each block after updating all rows etc. The Examiner then stated that Vagnozzi teaches a method wherein unpinning each block after updating all rows in said each block, in column 15, lines 23-27, which is reproduced below.

This allows any number of other retrieval operations on the table to proceed concurrently, while temporarily locking out update operations. The database is locked at the beginning of the query processing, and unlocked at the end of the query processing..

This text by Vagnozzi appears to disclose locking and unlocking of the database. There appears to be no disclosure of unpinning of a block during a write operation, in the above-quoted text. Note that Claim 10's write operation is performed from the cache to the storage device when space is needed in the cache as per Claim 9 (from which Claim 10 depends).

Furthermore, Claim 10's flushing of an unpinned block to disk is performed at a "block" level, only when another block needs space in the cache occupied by the unpinned block. In contrast, Hashimoto's paragraphs [0015] and [0016] cited by the Examiner appear to not be limited to "block" level storing of write data as shown below:

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[0015] The write cache function performed by the hard disk drive controller 21 will be described next.

[0016] The hard disk drive controller 21 caches write data transferred from the upper rank system 2 in RAM 22. Upon finishing the receiving of the write data from the upper rank system 2, the hard disk drive controller 21 informs the upper rank system 2 of the finish. The hard disk drive controller 21 stores the write data cached in RAM 22 in the magnetic recording disk 31 when the cache memory is full. If a plurality of write data is to be stored at the same address of the magnetic recording disk 31, the write data buffered earlier are abandoned and only the write data buffered latest are recorded in the magnetic recording disk 31. If a plurality of write data, which makes a series of continuous data, is received separately using respective write commands, the write data are combined and stored in the magnetic recording disk 31 as one...

Additionally, this text by Hashimoto appears to not disclose writing of a block only when space is needed in the cache. Claim 10 is therefore patentable for these additional reasons.

Note that Applicants also hereby traverse the Examiner's modification of the teachings of Kojima in view of one or more of Tolkin and/or Vagnozzi and/r Hashimoto for not adequately establishing a rational reason to combine these references. The Examiner appears to be relying on improper ex post reasoning to make the combination. Without the presence of Applicants' claims to act as a guide, neither one skilled in the art nor the Examiner would consider combining these references.

Claims 13-18 recite one or more limitations that are supported by arguments for patentability that are similar one or more of the arguments presented above in reference to Claim 1. Accordingly, these claims are also similarly patentable.

Claims 15 and 20

Claim 15 was rejected over the teaching of Vagnozzi as the primary reference, wherein Vagnozzi's teachings were modified by Kojima's teachings. See paragraph 10 on pages 16 and 17 of the current Office Action. This rejection is respectfully traversed.

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Firstly, the Examiner cited to Vagnozzi's column 10 lines 63-67, column 11 lines 1-5 and column 14 lines 29-33 against the first limitation of Claim 15. However, the Examiner has not identified what specific item in Vagnozzi's disclosure is referred to as the "block", what specific item in Vagnozzi's disclosure is referred to as the "block identifier", and what specific item in Vagnozzi's disclosure is referred to as the "pair".

Secondly, the Examiner cited to Vagnozzi's Claim 1 for teaching storage of the block identifier in a structure in memory. Here as well, the Examiner has not identified what specific item in Vagnozzi's Claim 1 is referred to as the "structure," and what specific item is referred to as the "block identifier."

Thirdly, the Examiner cited to Vagnozzi's column 12 lines 35-41 to explain completing the find operation multiple times. However, once again, the Examiner has not identified what specific step in the following text is referred to as the "find operation" and what specific item is referred to as the claimed "group of identifier and value pairs":

This single result bit vector is an accumulation of all the keys found in the search. Each operator executes on a single Slice Type value and Absolute Slice Number value. Depending on the operator, it executes on one or more Key Data Values. These operators are executed multiple times to operate on more than one Slice Type or Absolute Slice Number.

Is it the Examiner's position that Vagnozzi's "executes" is referred to as the find operation? Is it the Examiner's position that Vagnozzi's "operator" is referred to as the group of identifier and value pairs? Or is it Vagnozzi's "bit vector" which is referred to as the group of identifier and value pairs?

Fourthly, the Examiner admits that Vagnozzi does not disclose a vector read and cites to Kojima's column 6, lines 7-19 which is reproduced below.

instruction and the displacement field (A) of the instruction, to indicate the detected kind of vector instruction to the vector ALU 1709, which is comprised of a pipelined ALU. The set-up circuit 1703 reads the vector length from a general register designated by

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the R₁ field 1609 of the instruction 1601 to send the vector length to the vector ALU 1709. The set-up circuit 1703 reads out an operand descriptor address from a general register designated by the R₂ field 1610 of the instruction 1601, reads out an operand descriptor 1606 based upon the read out operand descriptor address, and, based upon the contents of the read out operand descriptor, reads out vector descriptors. The first element address and an

Note that the above-quoted text from Kojima appears to disclose how a vector instruction is executed by a vector ALU. Note further that such execution appears to be performed by Kojima after storage of vector data with a regular address increment in memory (see column 1 lines 57-60).

There appears to be no disclosure by Kojima, in the above-cited text, to retrieve from a disk and store in a cache, each block in a group of blocks identified by block identifiers in a structure, wherein the group of blocks are all stored in the cache during execution of a single function call.

Thus, Applicants respectfully submit that Claim 15 is not obvious over Vangozzi's teachings as modified by Kojima. Reconsideration and withdrawal of this rejection is respectfully requested.

New Claim 20 further distinguishes over the combination by requiring sorting based on adjacency of blocks relative to one another which is not disclosed in the combined teachings of Vangozzi and Kojima. For support of Claim 20, see paragraph [0030] on page 10 of Applicants' specification.

For the above reasons, Applicants respectfully request allowance of all pending claims. Please call the undersigned at (408) 378-7777 ext 113 in case of questions.

CERTIFICATE OF FACSIMILE TRANSMISSION

I hereby certify that this correspondence is being facsimile transmitted to the U.S. Patent and Trademark Office to the fax number 571-273-8300 on November 23, 2007.

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